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flat and single. The sponge grows out as a circular disk, later becoming irregular. It is covered by the flat ectodermal membrane and inside contains spicules all through the mesenchymatous substance of the body.

The various canals and cavities of the sponge arise here and there with no arrangement. Later they connect with one another and break through to the surface as oscula and pores. The ciliated chambers are formed in the midst of special clusters of bulky mesoderm cells that divide to make walls about the intercellular space thus bounded. The way in which these special cells form the ciliated chambers varies in different larvæ.

In discussing the remarkable gemmule development the author points out that, if it has any value as indicating the past history of sponges, it is evidence of the former existence of a solid ancestor as maintained by Metschnikoff. It is mainly, however, the resemblance of this non-sexual larva to the egg larva of other sponges that is to be emphasized. Pointing out the resemblance in the formation of "germ layers" and the peculiarities of the anterior pole and changes of the "ectoderm," Dr. Wilson then accentuates the comparison by applying certain views of Prof. Weismann. As any mesenchyme cell may, apparently, produce an ovum so any mesenchyme cell may unite with others to make a gemmule. The gemmule cell has, alone, but little histogenetic plasma, but an aggregate can form a larva. The gemmule cell is thus a germ-cell differing from the ovum in having its germ plasma not partly converted into ovogenetic plasma. Some such likeness between the egg cell and the gemmule cell is necessary to explain the observed resemblances between the egg larva and the gemmule larva.

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## ARCHAEOLOGY AND ETHNOLOGY.<sup>1</sup>

### MAN AND THE MYLODON.

#### THEIR POSSIBLE CONTEMPORANEOUS EXISTENCE IN THE MISSISSIPPI VALLEY.

In one of the alcoves of the Museum of the Academy of Natural Sciences, Philadelphia is to be seen a considerable number of fossil bones of extinct animals belonging to the pleistocene period. In color, texture and general outward appearance they have a remarkable sim-

<sup>1</sup>This department is edited by Dr. Thomas Wilson, of the Smithsonian Institution.

ilarity as though they had belonged together. They are well preserved, firm in texture, and of a dark chocolate-brown color which has been attributed to ferruginous infiltration. They consist of a nearly entire skeleton of *Megalonyx jeffersoni*, teeth of the *Megalonyx dissimilis* and the *Ereptodon priscus*, bones of the *Myiodon harlani*, bones and teeth of the *Mastodon americanus*, and teeth of *Equus major* and *Bison latifrons*. Along with them is the os innominatum of a human subject. The question affecting the antiquity of man is whether these subjects, the bones of which were found together, were, when alive, contemporaneous, and whether the evidence of age in one is evidence of age in the other. They were all presented to the Academy by Dr. Dickeson at the meeting in October, 1846; description thereof is to be found in the Proceedings of the Society for that year, vol. iii, p. 106. Dr. Dickeson reported at that time that they were discovered by him in a single deposit at the foot of the bluff in the vicinity of Natchez, Mississippi. He says "The stratum that contained these organic remains is a tenacious blue clay that underlies the diluvial drift east of Natchez, and which diluvial deposit abounds in bones and teeth of the *Mastodon giganteum*; that they could not have drifted into the position in which they were found is manifest from several facts, first, that the plateau of blue clay is not appreciably acted on by those causes that produce ravines in the superincumbent diluvium; second, that the human bone was found at least two feet below the three associated skeletons of the *Megalonyx*, all of which, judging from the position or proximity of their several parts, had been quietly deposited in this locality independent of any active current or any other displacing powers; and lastly, because there is no mixture of diluvial drift with the blue clay, which latter retains its homogenous character equally in the higher parts which furnished the extinct quadrupeds and in its lower part which contained the remains of man." These specimens thus found associated were made the subject of investigation by Sir Charles Lyell, and afterwards by Dr. Joseph Leidy, the latter having published a memoir with illustrations of the human bone in the Transactions of the Wagner Free Institute of Science, vol. ii, p. 9. He says "It differs in no respect from an ordinary average specimen of the corresponding recent bone of man."

Dr. Leidy says Lyell expressed the opinion that, although the human bones may have been contemporaneous with those of the extinct animals with which it has been found, he thought it more probable that it had fallen from one of the Indian graves and had become mingled with the older fossils which were dislodged from the deeper part of

the cliff, and Dr. Leidy adds: "In the wear of the cliff the upper portion, with the Indian graves and human bones, would be likely to fall first, and the deeper portions with the older fossils, subsequently on the latter."

Although Dr. Leidy testifies to the general similarity of appearance of the human with the other bones, it does not seem to have occurred to him to have them analyzed and compared. Remembering the story told by the analysis and consequent comparison of the Caleveras skull with that of the rhinoceros skull found in a formation corresponding in age, though in a different locality; and of the fact apparent therefrom that the Caleveras skull was in an equally advanced stage of fossilization as the rhinoceros skull, I deemed it wise to make an examination and test by analysis. To this end I applied to Prof. Angelo Heilprin, and through him to the authorities of the Philadelphia Academy, so a few months since specimens certified by Prof. Heilprin have been taken, one from the bone of the man and the other from one of the bones of the mylodon, choosing those which for size, texture and general appearance bore the greatest likeness one to the other. These were submitted by me to Prof. F. W. Clarke, Chemist of the United States Geological Survey, on duty at the National Museum, who has just returned the result of his analysis, which is here published for the first time.

#### TWO FOSSIL BONES.

	<i>Man.</i> Per cent.	<i>Mylodon.</i> Per cent.
Loss at 100°C.....	4.55	6.77
Loss on ignition.....	16.54	21.18
Silica.....( $\text{Si O}_2$ ).....	22.59	3.71
Phosphoric acid.....( $\text{P}_2 \text{O}_5$ ).....	17.39	23.24
Alumina.....( $\text{Al}_2 \text{O}_3$ ).....	3.21	4.02
Iron protoxide.....( $\text{Fe O}$ ).....	5.65	4.44
Manganese protoxide.....( $\text{Mn O}$ ).....	1.65	3.40
Lime.....( $\text{Ca O}$ ).....	25.88	30.48
Magnesia.....( $\text{Mg O}$ ).....	0.95	0.78
	<hr/> 98.41	<hr/> 97.02

Alkalies, carbonic acid and fluorine were not looked for, owing to the small amount of available material, hence the low summation.

The importance of this analysis will be apparent at a glance. The human bone is in a higher state of fossilization than is that of the

Myloodon. It has less lime and more silica. In their other chemical constituents they are without any great difference. Of lime the bone of the Myloodon has 30.48%, while that of man has but 25.88%. Of silica the Myloodon has 3.71%, while man has 22.59%. I am well aware of the ordinary uncertainty of this test when applied to specimens from different localities and subjected to different conditions; but in the present case no such differences exist. The bones were all encased in the same stratum of blue clay, and were subjected practically to the same conditions and surroundings. As one swallow does not make a summer so the discovery of one specimen does not prove the antiquity of man; but it is to be remarked that upon each discovery and in almost every investigation the evidence found points towards higher antiquity of man and tends to show the occupation of the earth by prehistoric man to be more and more extensive. This discovery is simply a fact to be put down to the credit of the high antiquity of man. We should proceed in the same direction to discover other evidences, to investigate the value of those already found; and as they accumulate, each one or all together should be given their fair value, in the endeavor to arrive at a truthful conclusion independent of *a priori* theory or preconceived idea.

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## MICROSCOPY.<sup>1</sup>

**Methods of Decalcification. Continued.**—*V. von Ebener's Hydrochloric Acid and Sodium Chloride Method.*<sup>2</sup>—To avoid the swelling caused by hydrochloric acid the author gives the following formula:

Hydrochloric acid.....	2.5 parts.
Alcohol.....	500. “
Sodium chloride.....	2.5 “
Distilled water.....	100. “

The fixed and hardened tissue is placed in this solution, which is daily strengthened by the addition of a small quantity of acid; when decalcified the preparations are washed in a half saturated aqueous solution of sodium chloride; when the solution shows an acid reaction it is neutralized by the addition of ammonia; this is repeated until the acid is entirely removed.

<sup>1</sup>Edited by C. O. Whitman, Clark University, Worcester, Mass.

<sup>2</sup>Wien. Sitzungsber., 1875, Zeit. f. wiss. Mikros., Bd. viii, p. 6, 1891.